



I-40 / I-81 Corridor Feasibility Study

Executive Summary

Task 4.0 Technical Memorandum

Project Priorities – A Corridor Plan

August 2008

Executive Summary

In 2005, the Tennessee Department of Transportation (TDOT) completed the State's first 25-Year Long Range Transportation Plan (PLAN Go). A major component of the 25-Year Vision Plan included the advancement of a 10-Year Strategic Investments Plan. The 10-Year Strategic Investments Plan established three interrelated core investment initiatives: Congestion Relief, Transportation Choices, and Key Corridors.

The Interstate 40/Interstate 81 (I-40/I-81) Corridor from Memphis to Bristol was identified through the statewide planning effort as a strategic statewide corridor and several projects along the corridor are included in the 10-Year Strategic Investments Plan as a high priority. The purpose of the I-40/I-81 Corridor Feasibility Study was to gain a more detailed understanding of the deficiencies of the corridor and to develop corridor level multi-modal solutions to address these deficiencies. The study considered improvements to the I-40/I-81 corridor, investigated parallel arterials to I-40/I-81 that could be used for local travel, rail lines that could be candidates for freight diversion from the interstate, and considered major inter-modal hubs located along the corridor.

The study area for the I-40/I-81 corridor extends from Memphis to Bristol, a distance of about 550 miles. The study area traverses 27 of the 95 counties within Tennessee and falls within nine of the twelve Rural Planning Organization (RPO) boundaries and eight of the eleven Metropolitan Planning Organization (MPO) and Transportation Planning Organization (TPO) areas. Numerous cities including Memphis, Jackson, Nashville, Lebanon, Cookeville, Crossville, Knoxville, Sevierville, Jefferson City, Morristown, Kingsport, Johnson City and Bristol are dependent upon this corridor for commerce, tourism, and daily access. The study area also includes parallel Class I railroads, including their junctions with short-line railroads.

The technical memorandum for Task 4, Project Priorities – A Corridor Plan, describes the benefit-cost (B/C) methodology which aided in the prioritization of multi-modal investments in order to develop a corridor plan of improvement solutions for I-40/I-81. The corridor plan estimates expenditures for each recommended improvement solution by year between 2010 and 2029. Costs have been inflated from 2008 dollars to year-of-expenditure expenses using an annual inflation rate of 3.6 percent. This yearly inflation rate is based on the annual increase in construction costs over the past ten years as maintained by the *Engineering News-Record*. The following sections review the solutions recommended in the corridor plan by category of improvement.

Cost-Effective Widening of Existing I-40 and I-81

Approximately 82 miles of the corridor should be widened based on the results of the B/C analysis conducted for the planning year of 2030. The improvements would be implemented based on B/C ratios estimated for the interim years of 2015 and 2020. The estimated cost for widening the following sections of I-40 and I-81 is \$900 million in 2008 dollars or \$1.48 billion in year-of-expenditure dollars:

- 9 miles of I-40 to 8 lanes in Memphis
- 17 miles of I-40 to 6 lanes east of Memphis
- 19 miles of I-40 to 6 lanes in Jackson
- 9 miles of I-40 to 6 lanes between Nashville and Lebanon
- 7 miles of I-40/I-75 to 8 lanes west of Knoxville
- 15 miles of I-81 to 6 lanes near Morristown

- 6 miles of I-81 to 6 lanes in Tri-Cities

Construction of Improvements that Provide an Alternative to Traveling I-40 and I-81

Based on a comparison of the benefits of building the following three solutions to their costs, which are estimated at \$1.3 billion (2008 dollars) or \$2.1 billion (year-of-expenditure costs), the following proposed improvements would provide a cost-effective alternative to using I-40 and I-81:

- New crossing of Mississippi River in Memphis
- North 2nd/ 3rd Street Connector, also in Memphis
- Knoxville Parkway (SR-475) in Knoxville

Although the completion of the remaining segments of SR-840 South had the highest B/C ratio of any project providing an alternative to traveling along I-40 or I-81, this solution was not included in the I-40/I-81 corridor plan. It was assumed these improvements are already programmed.

Expanded Intelligent Transportation Systems and Incident Management Programs

Over 136 miles of additional coverage for TDOT's existing Intelligent Transportation Systems (ITS) and incident management (HELP) programs are recommended based on B/C analysis completed during this study. New installations, at an estimated capital/equipment cost and ongoing operating expenses of \$41 million (year-of-expenditure dollars), are proposed along:

- 10 miles of I-40 at the Tennessee River Bridge/Cuba Landing
- 9 miles of I-40 at the Piney River Bridge south of Dickson
- 51 miles of I-40 located both east and west of Nashville
- 48 miles of I-40 across the Cumberland Plateau
- 18 miles of I-81 in Tri-Cities

Interchange, Ramp and Bridge Improvements

Operational solutions at 13 locations along I-40 and I-81 are recommended to address specific congestion or safety issues. These improvements were identified using information provided in interviews with representatives of the Tennessee Highway Patrol and local transportation officials. The proposed improvements, at an estimated cost of \$110 million in 2008 dollars or \$148 million in year-of-expenditure costs, also are based on highway capacity and accident analyses performed along I-40 and I-81.

Truck Climbing Lanes

In order to address congestion and safety issues associated with trucks traveling up steep grades on I-40 and I-81, construction of truck climbing lanes is recommended at 15 locations where the added lane provides the greatest benefits. The cost of widening the interstate at these locations is estimated at \$366 million (in 2008 dollars) or \$480 million (in year-of-expenditure dollars).

Table E-1 summarizes estimated costs of recommended I-40/I-81 corridor solutions by category for three time periods – 2010-2014, 2015-2019 and 2020-2029 – based on year-of-expenditure dollars. **Figure E-1** shows the location of each recommended solution for the I-

40/I-81 corridor along with a brief description and cost estimate for all solutions in the corridor plan.

In addition to the aforementioned solutions recommended for improving travel conditions along I-40 and I-81, the technical memorandum for Task 4, Project Priorities – A Corridor Plan, highlights the following strategies and future activities to be considered by TDOT, MPOs, TPOs and RPOs to address freight and operational issues along the corridor:

- Assess the public benefits of Norfolk Southern Railroad’s proposed improvements to the Crescent Corridor within Tennessee as they are identified.
- Inventory truck parking supply along I-40/I-81 to determine any imbalances in demand for overnight truck parking
- Improve the management and enforcement of existing high occupancy vehicle (HOV) lanes located along I-40 in Nashville and Memphis.
- Study the feasibility of specific active traffic management (ATM) strategies along I-40 and I-81.

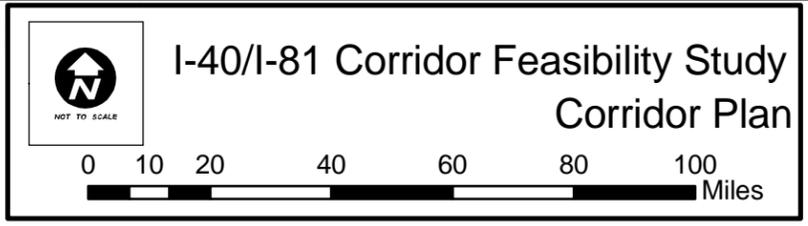
Table E-1: Summary of Recommended I-40/I-81 Corridor Plan (Year-of-Expenditure Dollars)

Improvement Category	Five Years (2010-2014)	Five Years (2015-2019)	10-Years (2020-2029)	Total (2010-2029)
Widening of Existing I-40/I-81 (Roadway Capacity Solutions)	\$228,176,000	\$303,976,000	\$943,267,000	\$1,475,419,000
Construction of Alternatives to I-40/I-81 (Corridor Capacity Solutions)	\$132,852,000	\$648,314,000	\$1,316,732,000	\$2,097,898,000
Truck Climbing Lanes	\$127,296,000	\$336,868,000	\$16,072,000	\$480,236,000
Interchange, Ramp & Bridge Improvements	\$75,673,000	\$0	\$72,267,000	\$147,940,000
Expanded ITS/HELP Programs	\$11,397,000	\$10,505,000	\$19,067,000	\$40,969,000
TOTAL	\$575,394,000	\$1,299,663,000	\$2,367,405,000	\$4,242,462,000

NOTE: Costs are year-of-expenditure dollars using an average annual 3.6 percent cost escalation based on *Engineering News-Record* construction cost index.

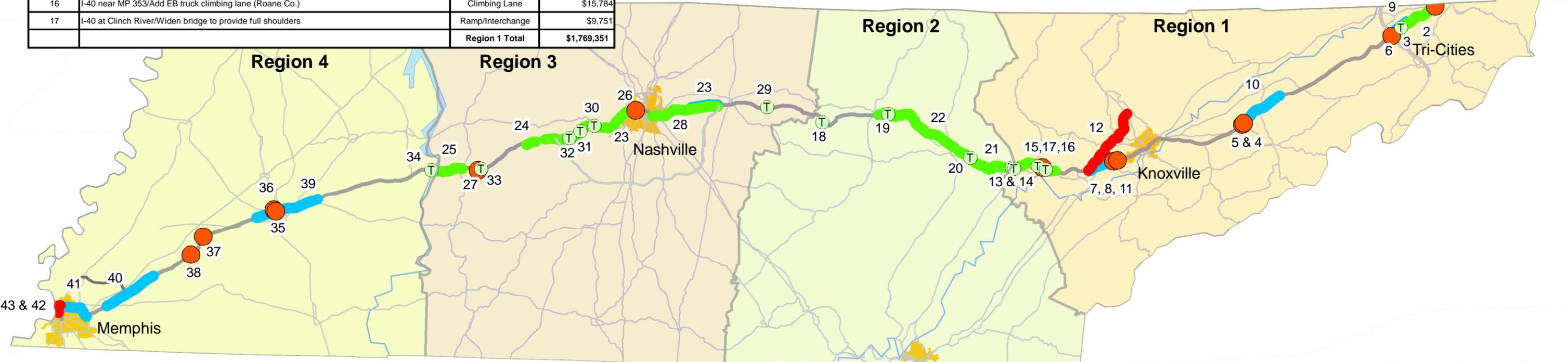
Region 1 Project Cost (Year-Of-Expenditure Dollars in Thousands)

Location	Description/Type of Work	Solution Category	Total (2010-2029)
1	I-81 widening interchange (Exit 69) near TN/ VA stateline	Ramp/Interchange	\$268
2	I-81 from I-26 (Exit 57) to State Line (Exit 75)/ ITS Freeway Management	ITS	\$7,551
3	I-81 near MP 60/Add EB truck climbing lane (Sullivan Co.)	Climbing Lane	\$29,357
4	I-40/I-81 Interchange/Lengthen ramps	Ramp/Interchange	\$1,497
5	I-81 Rest Area in Jefferson County/Lengthen ramps	Ramp/Interchange	\$723
6	I-81/I-26 Interchange/Re-construct	Ramp/Interchange	\$72,267
7	I-40 from I-75 (Exit 369) to I-140 (Exit 376)/Add WB auxiliary lane	Ramp/Interchange	\$1,312
8	I-40 Weigh Station in Knox County/Lengthen ramps	Ramp/Interchange	\$1,236
9	I-81 from I-26 (Exit 57) to SR-357 (Exit 63)/Widen to 6 lanes	Roadway Capacity	\$211,223
10	I-81 from I-40 (Exit 1) to SR-340 (Exit 15)/ Widen to 6 lanes	Roadway Capacity	\$304,942
11	I-40 from I-75 (Exit 369) to I-140 (Exit 376)/ Widen to 8 lanes	Roadway Capacity	\$183,460
12	SR-475 (Knoxville Parkway)/Construct new roadway	Corridor Capacity	\$828,821
13	I-40 near MP 341/Add WB truck climbing lane (Roane Co.)	Climbing Lane	\$35,054
14	I-40 near MP 342/Add WB truck climbing lane (Roane Co.)	Climbing Lane	\$32,660
15	I-40 near MP 350/Add WB truck climbing lane (Roane Co.)	Climbing Lane	\$33,444
16	I-40 near MP 353/Add EB truck climbing lane (Roane Co.)	Climbing Lane	\$15,784
17	I-40 at Clinch River/Widen bridge to provide full shoulders	Ramp/Interchange	\$9,751
	Region 1 Total		\$1,769,351



Region 2 Project Cost (Year-Of-Expenditure Dollars in Thousands)

Location	Description/Type of Work	Solution Category	Total (2010-2029)
18	I-40 near MP 270/Add EB truck climbing lane (Putnam Co.)	Climbing Lane	\$37,837
19	I-40 between MP 293-MP 297/Add EB truck climbing lane (Putnam Co.)	Climbing Lane	\$104,683
20	I-40 near MP 326/Add WB truck climbing lane (Cumberland Co.)	Climbing Lane	\$16,797
21	I-40 near MP 339/Add EB truck climbing lane (Cumberland Co.)	Climbing Lane	\$27,095
22	I-40 from Spring St (Exit 290) to SR-299 (Exit 338)/ ITS Freeway Management	ITS	\$10,003
	Region 2 Total		\$196,416



Region 3 Project Cost (Year-Of-Expenditure Dollars in Thousands)

Location	Description/Type of Work	Solution Category	Total (2010-2029)
23	I-40 from SR-46 (Exit 172) to Briley Parkway (Exit 204) and from Donelson Pike (Exit 216) to SR-840 (Exit 235)/ ITS Freeway Management	ITS	\$17,432
24	I-40 at Piney River, from SR-48 (Exit 163) to SR-46 (Exit 172)/ ITS Freeway Management	ITS	\$2,970
25	I-40 at Tennessee River, from SR-191 to SR-13S (Exit 143)/ ITS Freeway Management	ITS	\$3,012
26	I-40/I-440 Interchange/Lengthen ramp	Ramp/Interchange	\$3,214
27	I-40/SR-50 Interchange/Lengthen ramps	Ramp/Interchange	\$1,440
28	I-40 from Mt. Juliet Rd (Exit 226) to SR-840 (Exit 235)/ Widen to 6 lanes	Roadway Capacity	\$66,217
29	I-40 near MP 250/Add EB truck climbing lane (Smith Co.)	Climbing Lane	\$15,739
30	I-40 near MP 189/Add WB truck climbing lane (Cheatham Co.)	Climbing Lane	\$21,576
31	I-40 near MP 186/Add WB truck climbing lane (Cheatham Co.)	Climbing Lane	\$30,106
32	I-40 near MP 180/Add EB truck climbing lane (Dickson Co.)	Climbing Lane	\$28,744
33	I-40 near MP 149/Add WB truck climbing lane (Hickman Co.)	Climbing Lane	\$20,263
	Region 3 Total		\$210,714

Region 4 Project Cost (Year-Of-Expenditure Dollars in Thousands)

Location	Description/Type of Work	Solution Category	Total (2010-2029)
34	I-40 near MP 133/Add WB truck climbing lane (Benton Co.)	Climbing Lane	\$31,096
35	I-40/US-45 Bypass & I-40/US-45 Interchanges/Re-construct & add auxiliary lanes	Ramp/Interchange	\$47,138
36	US-412 (Hollywood Dr) from I-40 to Miller Dr/Widen to 5 lanes	Ramp/Interchange	\$7,082
37	I-40/SR-76 Interchange/Lengthen ramps	Ramp/Interchange	\$1,288
38	I-40 Weigh Station in Haywood County/Lengthen ramps	Ramp/Interchange	\$723
39	I-40 from Lower Brownsville Rd (Exit 74) to SR-152 (Exit 93)/ Widen to 6 lanes	Roadway Capacity	\$345,431
40	I-40 from Germantown (Exit 18) to SR-59 (Exit 35)/ Widen to 6 lanes	Roadway Capacity	\$196,643
41	I-40 from SR-300 (Exit 3) to Sycamore View Rd (Exit 12)/ Widen to 8 lanes	Roadway Capacity	\$167,502
42	North 2nd/3rd St Connector from Downtown Memphis to I-40/SR-300 (Exit 3)/Construct new roadway	Corridor Capacity	\$80,605
43	New Mississippi River Crossing north of existing I-40/ Construct new bridge	Corridor Capacity	\$1,188,471
	Region 4 Total		\$2,065,980

Figure E-1:
Recommended Solutions and Cost for I-40/ I-81 Corridor (Year-Of-Expenditure)